CLAIMS:

1. A porous biomechanically and biochemically compatible nickelide of titanium (TiNi) material comprising:

a matrix of TiNi comprising interconnected struts, each strut having an outer surface and an internal zone, the matrix having an atomic ratio of Ni:Ti varying from 0.96:1 to 1.13:1 and including a maximum concentration of 10 atomic % of oxygen with the balance being Ni and Ti wherein the Ni concentration is limited to a maximum 53 atomic%;

composite precipitates interspersed within the matrix; and

a multiplicity of interconnected pores defined by the matrix, wherein the pores have a pore size distribution given as follows;

Pore Size (μm)	Percentage
<50 μm	< 5%
50 to 500 μm	> 75%
> 500 μm	balance

wherein the material has an open porosity varying from 35 to 80% and the matrix having mechanical properties suitable for surgical implantation, and

wherein the matrix is devoid of Ni-enriched secondary phases.

2. The material according to claim 1, wherein the matrix has an atomic ratio of Ni:Ti varying from 0.99:1 to 1.04:1 and including a maximum concentration of 2.2 atomic % of oxygen in the internal zone with the balance being Ni and Ti.

3. The material according to claim 1 or 2, wherein the composite precipitates comprise Ti-enriched secondary phases comprising oxygen limited to a maximum of 28 atomic % and the balance is Ni and Ti, wherein the atomic ratio of Ni:Ti varies from 0.37:1 to 0.95:1.

4. The material according to claim 3, wherein the Ti-enriched secondary phases comprise oxygen between 2.0 and 17.0 atomic % and the balance is Ni and Ti, wherein the atomic ratio of Ni:Ti varies from 0.49:1 to 0.53:1.

5. The material according to claim 3 or 4, wherein the Ti-enriched secondary phases comprise oxygen between 2.3 and 3.4 atomic %.

6. The material according to any one of claims 3 to 5, wherein the Ti-enriched secondary phases have a spheroid configuration and an average diameter of 10 μm.

7. The material according to any one of claims 1 to 6 wherein the composite precipitates within the matrix are limited to less than 15% by volume.

8. The material according to any one of claims 1 to 7 wherein the matrix comprises martensite and austenite.

9. The material according to any one of claims 1 to 8, wherein the mechanical properties of the matrix comprise:

an elastic modulus under compression between 0.2 and 3.0 GPa;

a maximal elastic deformation more than 2%;

an ultimate strength between 50 and 250 Mpa;

strain to failure up to 75%; and

a yield strength between 1.5 to 50 MPa.

10. Use of the material as defined in any one of claims 1 to 9, in the manufacture of a surgical implant.

11. The use according to claim 10, wherein the surgical implant is selected from the consisting of cervical implants, lumbar fusion devices, vertebral replacement devices, artificial discs, and acetabular cup replacements (of the hip).

12. A surgical implant fabricated of the material as defined in any one of claims 1 to 9.